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### NOTES ON MILKWEED INSECTS IN NEW JERSEY.

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In the following notes which are the results of nearly a year's observations on the insects associated with *Asclepias syriaca* (*A. cornuti*), the common species of the eastern states, and *Asclepias pulchra*, which is considered a variety of *Asclepias incarnata*, special attention is paid to those species about which little or nothing has been recorded heretofore. However, in order to make the paper more complete, it was thought desirable to treat other milkweed insects briefly and to indicate where important papers relating to them could be found.

The milkweeds which are persistent perennials in many waste places are widely distributed in North America and are best recognized by their opposite or whorled leaves, flat-topped clusters of showy flowers and their milky juice. In the flowers, the stamens are united at least at the base and each of them bears a large dorsal appendage. These appendages together form the corona. Especially characteristic are the club-shaped pollen masses or pollinia. For the purpose of pollination by insects, the pollinia are attached in pairs to a corpusculum or glandular outgrowth of the stigma.

A paper on milkweed insects would not be complete without reference to Robertson's writings on the "Insect Relations of Certain Asclepiads" (Bot. Gaz., Vol. 12, 1887, pp. 207-216; pp. 244-250; Trans. St. Louis Acad. Sci., 1891, pp. 569-577). In the first paper, the various species of *Asclepias* are treated together with notes on

floral parts and the parts of the insects to which corpuscula are attached. According to Robertson, in *Asclepias incarnata*, the small anther wings are adapted to fasten the corpuscula upon the legs of large insects from the claws to the middle of the tibiae and on the claws and tarsal hairs of the smaller ones, but they catch the hairs much more frequently. In *Asclepias cornuti*, the anthers are much larger than in *A. incarnata* and as a consequence the corpuscula are fastened to the claws of insects more frequently. The tarsal hairs are not readily caught unless they are long. However corpuscula are found more frequently on the pulvilli and on the hairs near the claws than on the claws. For references to other species of *Asclepias*, the reader is referred to Robertson's paper. At the end of the article *Asclepias* in general are treated and the following table given. This shows the number of species visiting the flowers together with the disposition of the corpuscula on them. In the table, the pulvilli are included under hairs.

	Hymen.	Butterflies.	Other Lep.	Diptera.	Coleop.	Hemiptera.	
Corpuscula on hairs, claws, tongue.....	14				2		16
Corpuscula on hairs and claws.....	8	7				1	16
Corpuscula on hairs, tongue.....	5	1		3			9
Corpuscula on hairs alone.....	26	15	1	7	2	3	54
Corpuscula on claws alone.....	3						3
Corpuscula on tongue alone.....	1			2			3
Corpuscula, none.....	13	12	6	13	5		49
	70	35	7	25	9	4	150

In the second paper in the Botanical Gazette, Robertson discusses the distribution of the pollinia on various groups of insects which visit the flowers. The third paper contains detailed lists of the flower visitors and notes on the distribution of the corpuscula.

***Tetraopes tetraophthalmus* Forst. (Coleop.).**

This insect, known as the milkweed beetle, is common throughout New Jersey and elsewhere, feeding on the leaves, tender tips, stems, buds and flowers of several species of *Asclepias*. In New Jersey, it occurs during June, July, August and the first part of September. In the middle section of the State, the beetles were first noted on

June 19 and continued in evidence until the first part of September. The majority of them appeared to copulate during July and the first half of August.

When the beetles first appear, they feed upon the young leaves. Later the flower buds appear and these are eaten and lastly, the flowers are devoured. As a result, the plants become ragged and streaked with the milky white juice, which runs from the punctures and hardens. *Asclepias syriaca* seems to be the favorite milkweed, although beetles were observed feeding to a certain extent on the leaves and flowers of *Asclepias pulchra* and beetles were collected from the flowers of *Acerates viridiflora*, a plant resembling and related to the milkweeds. Our efforts to secure eggs of this species resulted in failure. Numerous beetles were gathered and placed in a roomy outdoor cage together with growing milkweeds and while they fed and copulated extensively, they refused to deposit eggs. However, through the kindness of Dr. F. H. Chittenden, we secured several eggs which had been deposited in confinement on leaves, by beetles collected by Mrs. D. H. Blake at Riverdale, Md., during the last of July. Females collected on July 18 and dissected were found to contain from 45 to 55 fully developed, elongate, whitish eggs. It is not known just where the eggs are laid in the field. Various parts of the plants were examined, with negative results. It seems probable, however, that they might be deposited at the base of the plant close to the main stem, in view of the fact that many larvæ are found in the lower stem and main root not far from the top of the soil.

The first larvæ were found on July 31 at Red Bank, N. J., on the main stem below the ground surface and on the larger roots. In each case they were found in shallow channels covered over more or less with soil, which stuck to the injured portions, probably because of the sticky nature of the plant juice. Later in the season, it was possible to find larger larvæ and by the middle of October, they varied from one half inch in length to apparently full grown. At this time, several large larvæ were found in the soil close to the lower main stem and among the small roots. Other large ones were found in shallow channels in the main lower stem. Still others were located under the bark of the main lower stem and out of sight, while several small ones were dug from the lower end of the main stem. These small ones were well inside the stem in irregular, longitudinal chan-

nels. When digging around the stem and roots for larvæ, it is usually possible to find some in the soil before the main root is uncovered. Therefore, some larvæ eat into the root from the outside, while others burrow to a certain extent at least a part of their time in the root itself. Mr. Craighead informs us that galleries are found extending from root to root through the earth, then continuing up to near the surface of the ground where pupation occurs.

Devereaux (Can. Ent., Vol. X, p. 143, 1878) states that while he was plowing through a patch of *Asclepias cornuti*, during the early part of June, 1876, he observed numerous cerambycidian larvæ in the bottom of the furrow, stirring about in the soil. Two of them were put in a glass jar with a milkweed plant. The larvæ soon came to the surface, pupated and adults of *T. tetraophthalmus* emerged later. Mr. Craighead is of the opinion that the larval period extends through two years as pupæ, and young larvæ can be found in the early summer.

EGG. Length, 1.85 mm. Width, 0.42 mm. Pearly white, comparatively smooth; elongate, rounded at both ends, sides almost parallel, tapering slightly to posterior end.

FULL GROWN LARVA. The following description was kindly supplied by Mr. F. C. Craighead from a paper of his now in press. A description of the pupa will also appear in a future paper by the same author. "Form robust, fleshy, cylindrical or slightly tapering posteriorly; texture very finely wrinkled, shining, densely clothed with long whitish lemon-colored hairs.

"Head rather thick but depressed, sides narrowing posteriorly, suddenly constricted about middle, widest across posterior limit of front; epistoma thick, rugulose; clypeus and labrum thick, latter transverse, roundly semi-circular from base, densely haired; mandible from side about two times the basal width, outer face rather rugulose, cutting edge obliquely truncate, molar tooth distinct; antennal cavity bisected by frontal suture; ocelli not distinct; ventral mouth parts fleshy, thick; mentum distinct, transverse; maxillary palpi two-jointed, last joint slender, shorter than the basal, equal to the last labial; hypostoma transversely bulging, finely wrinkled; gula less corneous.

"Prothorax very thick, about two times as wide as long; protergum densely hairy on sides also across anterior border; pronotum posteriorly finely velvety pubescent; prosternum densely hairy, lateral areas swollen; eusternum distinct, swollen; sternellum very narrow, transverse. Mesonotum and metanotum densely hairy, mesonotum with an anterior transverse band of hairs, posteriorly glabrous.

"Abdomen very densely hairy; ampullæ narrow, projecting in large dull tuberculiform lobes; later zone slightly protuberant on all segments, tubercles elongate, oval, bearing very many hairs and no chitinous pits; spiracles large, orbicular."

The adult was described in 1771 (Forst., Cent. Ins., p. 41) and later mentioned in various lists and publications. Several other species of *Tetraopes* have been described, most of them being associated with milkweeds.

***Rhyssematus lineaticollis* Say (Coleop.).**

This species which is listed by Smith (Ins. N. J., p. 390) as occurring in widely separated parts of the State is quite common throughout New Jersey, appearing about the first week of June and feeding at the bases of the young leaves of milkweed, especially *Asclepias syriaca*. It has long been known to breed in the seed pods of milkweed. Webster (Ins. Life, II, p. 112), in his paper on "Notes on Breeding and Other Habits of Some Species of Curculionidæ, Especially of the Genus *Tyloderma*," states that it breeds in the seed pods of *A. incarnata*, the larva feeding upon the seeds and transforming to an adult in late autumn although these notes may possibly refer to *Rhyssematus annectans* Casey, a related species which we have found breeding in the seed pods of *Asclepias pulchra* (*incarnata*). He gives a very brief general description of the larva and states that it is parasitized by a species of *Bracon*.

In addition to feeding on the young leaves early in the season, later the beetles attack the leaf petioles, midribs of leaves, seed pods and upper portions of the main stem. As a result the injured parts bleed profusely and the milky juice hardens into unsightly yellowish white streaks and blotches. In the central part of the State, eggs are laid during the last half of July. They are deposited inside the seed pod through an opening cut by the adult and can be found on the inner side of the seed pod wall, close to this opening. Many

yellowish white eggs were found in such places, the number varying from one to five. The egg scars on the seed pod are usually covered over with a yellowish white scab of dried juice and are easily located by such exudations.

Upon hatching the larvæ first feed on the inner surface of the green seed pod wall and then eat their way through the spongy tissue between the wall and the developing seeds, until the seeds are reached. Here they complete their growth, destroying more or less of the young white seeds. The number of larvæ in a single pod varies from one to twenty. When many are present the entire interior of the seed pod is consumed, nothing being left except the outer wall. By the first and second week of August many larvæ become full grown at which time they leave the seed pod through a hole in the wall and drop to the ground. Many simply crawl out if the pod is cracked open which is usually the case after much of the interior has been destroyed. After reaching the soil they enter it to a depth of about one inch and at the end of a week have transformed to pupæ. The pupal stage requires from ten days to two weeks after which several days are required for the beetles to color and harden. Emergence in large numbers takes place during the first two weeks of September and the beetles feed on the milkweeds before seeking hibernation quarters. In the northern part of the state, at Rutherford, eggs and young larvæ were found as late as August 17. There appears to be only one generation each year and we found *lineaticollis* confined entirely to *Asclepias syriaca*.

EGG. Length 0.89 mm. Width 0.39 mm. Whitish. Somewhat capsule-shaped; both ends rounded, one end slightly wider than the other; sides almost parallel; chorion apparently smooth.

FULL GROWN LARVA. Form subcylindrical, tapering slightly at both ends, slightly curved, almost smooth, whitish, head brownish. Length of mature larva about 12 mm. Width about 3 mm.

Head small, subcircular, sparsely hairy, slightly depressed; collum absent; occipital foramen subtriangular; epicranial halves separated dorsally by a faint median suture; front subtriangular, bearing several slightly depressed spots; gula indistinct, membranous; ventral mouth parts somewhat fleshy; maxillary sclerite indistinct, not cushioned; clypeus and labrum distinct, former transverse, latter

subtransverse; antennæ minute, single jointed, almost obsolete; ocelli absent; mandibles of biting type, broad across base, bifid at tip; maxilla fused with labium to near apex; lacinia simple, fringed with chitinous hairs on inner surface; galea absent; maxillary palpi two-jointed, first joint barrel-shaped, apical joint minute; cardo subquadrate with distal and articulating angles strongly acute; labium subquadrate with mentum and submentum fused, indistinct; labial palpi one-jointed. True legs absent, indicated by ambulatory tubercles. Thoracic and abdominal segments somewhat similar, transversely wrinkled, each with three dorsal plicæ. Hypopleural chitination absent. Cerci absent. Anal segment wart-like. Spiracles bifore.

PUPA. Length about 7 mm. Width 2.5 mm. to 3 mm. Oval, whitish. Rostrum bearing a pair of dorsal chitinated hairs below antennal insertion; a pair just opposite to where antennæ arise and a pair above near the eyes. Head with a group of three chitinated hairs on either side of middle and above the eyes. Prothorax triangular dorsally, bearing a longitudinal row of three spines on either side of a median line. Dorsal anterior edge of prothorax fringed with a row of distantly placed spines; posterior edge bearing only a few lateral spines. Mesothorax with a subhemispherical median tubercle on posterior edge; anterior to this tubercle on either side of middle are a pair of spines. Metathorax with a broad shallow, median, dorsal depression with a pair of spines on either side. Abdominal segments each with a shallow, median, dorsal depression and three spines on each side arranged transversely on a slight ridge. Abdominal segments 5, 6, 7 and 8 bear a similar pair of lateral spines. Anal segment terminated by two more chitinated dorso-lateral spines and several smaller ones. Wing cases each bearing four pronounced longitudinal rows of minute spines, these spines becoming more prominent toward bases of wing cases. Distal outer portions of femora each bearing a pair of spines. All spines with tuberculate bases.

ADULT. *Rhysematus lineaticollis*. This was described by Say in 1824 (Jour. Acad. Nat. Sci., Vol. 3, p. 313) from Arkansas, under the generic name *Tyloderma*. According to Blatchley and Leng (Rhyn. N. E. Amer., p. 484) it ranges from Mass., to Mich., and Kansas, south to Florida and Texas.



**Rhyssomatus annectans** Casey (Coleop.).

This beetle which is distinguished from *R. lineaticollis* by its usually more narrow form but especially by its oblique thoracic strigæ was first thought to be identical with *lineaticollis* but the two are distinct as we have found by breeding them out. *Annectans* is recorded by Dury (Blatch. & Leng, Rhyn. N. E. Amer., p. 484) as abundant and eating out the heads of swamp milkweed (*Asclepias incarnata*), May 24 and its distribution according to Blatchley and Leng (*loc. cit.*) is Ohio, Indiana and Illinois. While not heretofore recorded from New Jersey, we have found it to be a common species occurring in numbers and breeding in the stems and seed pods of *Asclepias pulchra* at Riverton, Monmouth Junction, New Brunswick and several other places in the State. We have not found *annectans* associated with any other milkweed except *Asclepias pulchra*.

In New Jersey, the adults appear during June and by the middle of this month are in full evidence. Before and at this time feeding takes place on the stems and terminal leaves. In addition the leaf petiole and midrib are also attacked. In many cases, the stem is riddled with circular feeding and egg laying punctures. The presence of many beetles is readily detected by the wilted tops of the plants, due to excessive injury. In time, the tissue around the stem punctures becomes hard, corky and discolored.

During the last ten days of June, eggs are deposited, these being placed at the bottoms of channels eaten in the stems sometimes almost to the pith, the openings of the channels being closed by whitish scabs of tissue and plant juice, which eventually dry and fall off. Eggs are deposited singly, mainly in the lower half of the stem, although all parts of the stem are utilized for this purpose except the extreme tip. Both egg and feeding punctures are similar on the stem but egg punctures can be detected early by the scab-like coverings. Later, both become hard, corky and discolored around the edges. From two to ten eggs were found in stems eight inches in length and later, the number of larvæ in a stem varied from one to nine. Some stems were completely covered with egg and feeding punctures, sixty being counted on a stem one foot high.

By the last week of July many partly grown larvæ are in evidence.

After hatching they burrow just under the bark and later usually down but sometimes up the stem in the tissue and pith, making irregular, longitudinal channels, sometimes hollowing the stem completely out. During the second week of July, pupæ were found, this stage taking place in the larval channels. During the last week of July and first week of August adults appear, having emerged through circular holes in the stem.

This completes the first brood. During the last of August and first part of September, these adults deposit eggs in the seed pods of *Asclepias pulchra*, these being laid singly inside the pod just beneath the outer covering. Egg punctures can be located by the reddish discolorations around them. A small amount of sap runs from these punctures but nothing like the amount which exudes from *syriaca* seed pods when punctured by *lineaticollis*. From one to nine eggs were found in a single pod. After hatching the larvæ feed on the developing seeds usually in the centre of the mass and when full grown pupate in cells composed of frass, etc., in the middle basal portion of the seed cluster. During the first part of October many pupæ were found. By this time all of the infested pods had split open on one side exposing the seeds; the seeds however do not disperse being webbed up and held together. During the first ten days of October the beetles leave the infested seeds and disappear. Shortly afterward, the seeds and parts of seeds fall from the plant.

EGG. Slightly smaller, but otherwise similar to that of *lineaticollis*.

LARVA. Slightly smaller but otherwise apparently similar to that of *lineaticollis* except that in specimens which we examined, there appear to be slight variations in the arrangement of the body hairs. There are also variations in the lengths of the body hairs but on the whole, those of *lineaticollis* are slightly longer than those of *annectans*.

PUPA. Apparently similar to that of *lineaticollis* except that the tubercles, spines and hairs are weaker. Size slightly smaller than that of *lineaticollis*.

ADULT. *Rhyssomatus annectans*. This was described by Casey in 1895 (Annals N. Y. Acad. Sci., VIII, p. 834) "from the Levette cabinet but without labels" and probably from Indiana.

**Chelymormpha argus** Licht. (Coleop.).

This species known as the argus tortoise beetle is recorded by Blatchley (Col. Ind., p. 1233) as throughout Indiana, frequent, April 7 to August 11, on milkweed and wild potato. Smith (Ins. N. J., p. 356) says, common on *Convolvulus* and *Asclepias*, but we have not found it to be common on the latter. In the U. S. D. A. Yearbook (1908, p. 579) it is mentioned as injuring morning glory and moon-flower vines in western Texas. Webster and Mally (Bull. 17, n. s., Div. Ent. U. S. D. A., p. 99, 1898) state that adults were reared from larvæ found in Ohio on strawberry vines.

It is probably best known as a wild morning glory and sweet potato pest and as such is treated by Crosby and Leonard in their Manual of Vegetable Garden Insects (1918, p. 238). Additional food plants given by these authors are sunflower and horse radish. Sanderson (Ins. Pests Farm Garden, Orchard, p. 436) figures the eggs, larvæ and adults and gives short descriptions. Chittenden (Bull. 9, n. s., Div. Ent. U. S. D. A., p. 23, 1897) gives an account of its activities on sweet potatoes, and also mentions the larva as feeding on *Asclepias* but states that they prefer *Convolvulus*. Packard in his "Guide" (p. 504) recorded the beetles as abundant on the leaves of raspberry.

**Oncopeltus fasciatus** Dallas (Hemip.).

Known as the milkweed bug, this species is well distributed throughout New Jersey, occurring principally on *Asclepias syriaca* but being found on other milkweeds as well. Adults appeared to be most plentiful during July and October, although they were found from June on. The adults hibernate and deposit their elongate light red eggs in loose masses on the young milkweeds during the spring. The nymphs and adults also feed on these plants, usually occurring in colonies. Essig (Inj. and Ben. Ins. Cal., 2d ed., Suppl. Mon. Bul. Cal. St. Comm. Hort., Vol. IV, no. 4, 1915) gives a brief account of this species and mentions *Lygæus reclivatus* Say as another common milkweed bug. Morrill (U. S. Bur. Ent. Bul., 86, p. 93, 1910) in his paper on plant bugs injurious to cotton bolls writes as follows, "two large lygæids, *Oncopeltus fasciatus* Dall., and *Lygæus turcicus* Fab.,<sup>1</sup> were common on cotton at Tlahualilo, Durango, Mex-

<sup>1</sup> Mr. H. G. Barber suggests that this may be *Lygæus kalmii*.

ico, in July, 1905, and young of both species were found feeding on alfalfa. They have been observed to attack cotton squares and bolls. Milkweeds (*Asclepias* spp.) seem to be the natural food plants of both of these species."

EGG. Heidemann (Proc. Ent. Soc. Wash., Vol. XIII, no. 3, p. 133, 1911) has the following to say about the egg. "*Oncopeltus fasciatus* has oval-elongate eggs, a little shorter in size than those of the preceding species (*Belonochilus numenius*). The chorial process is very short and thin at the base and the round downward-bent portion quite big; there are 12 processes surrounding the upper end of the egg. The outer chorion smooth, yellowish-red." A drawing of the egg accompanies this reference.

LAST STAGE NYMPH. Length 9 to 11 mm. Width, 3.5 to 4 mm. Elongate oval, widest across middle portion of abdomen, tapering gradually to head; posterior portion of abdomen broadly rounded. Head triangular, obtusely angled in front, slightly rugose, with more or less pronounced, median, dorsal, slight, broadly rounded ridge extending from apex to middle portion, posterior to which is a slight, curved, transverse depression. Antennæ linear, finely pubescent, about one half as long as body, inserted laterally, four jointed, basal joint short, second three times as long as basal, third shorter than second, distal joint equal to second and obtusely rounded. Eyes lateral, prominent. Prothorax almost twice as wide as long, anterior margin concave; sides straight gradually widening to posterior margin which is subconcave. Mesothorax slightly wider, with wing-pads reaching posterior margin of third abdominal segment. Lateral margins of wing-pads slightly rounded. Sides of abdominal segments slightly rounded. Rostrum four jointed reaching beyond posterior margin of thorax. Legs finely pubescent, comparatively long and slender. Color, reddish orange except for the following portions which are dark to black;—antennæ, legs, rostrum, upper portion of head (in most specimens), eyes, posterior margin of prothorax, lateral portions of dorsum and all of the wing-pads of the mesothorax, lateral spots on all of the abdominal segments and median dorsal spots on the fifth, sixth, seventh, eighth and ninth abdominal segments, apex of ventral abdominal surface.

ADULT. *Oncopeltus fasciatus*. This species was named by Dallas

(Brit. Mus. Hemip. Insects, 1, 2, 1851-1852, p. 538) from a description drawn up by Herrich-Schaffer who apparently misidentified Fabricius's *aulicus* (Wanzenartigen Insecten, 1842, Band VI-IX, pp. 76-77). Dallas (loc. cit.) in addition to the United States, lists specimens as having been received from Mexico, Brazil, Colombia and British Guiana. Van Duzee in his check list gives numerous references to the species and the localities listed indicate a wide distribution in the United States.

***Lygæus kalmii* Stal. (Hemip.).**

In Ent. Amer., Vol. III, p. 53, 1887, Townsend under the name *Lygæus turcicus* Fab., calls attention to the early papers dealing with the feeding habits of this species and notes his own observations on this insect in Michigan. He states that it is common on *A. tuberosa* and sometimes on *A. syriaca*, being found from June to September and that it probably hibernates as an adult. He speaks of obtaining from 6 to 35 eggs from various females. In New Jersey, *Lygæus kalmii* occurs throughout the State from April to October, on several species of milkweeds.

***Agromyza pusilla* Mg. (Dip.).**

The milkweed leaf miner *Agromyza pusilla* Mg., is a common species throughout New Jersey especially on *Asclepias syriaca*. The mines consist of irregular, whitish blotches on the upper leaf surface. Sometimes the mines run together forming a large blotch, which takes up a considerable portion of one half of the leaf. As a rule, the mines start between the side veins and some often have two parallel sides due to the failure of the larva to mine beyond the veins. The number of mines in a leaf varies from one to several. When full grown the larvæ leave the mines and fall to the ground where they pupate in soil cracks, under leaves, etc. There are several generations in New Jersey and larvæ can be found almost any time from the middle of May to the middle of September. *Asclepias pulchra* leaves were not mined to the same extent as those of *Asclepias syriaca* and in *pulchra* the edges of the mined area were somewhat reddish. It was noted that almost any kind of insect injury to *pulchra* resulted in reddish discolorations around the injured portions.

There are several accounts of this species in European literature.

Goureau in the Annales de la Society Entomologique de France (Vol. IX, p. 138, 1851) figures the mine, adult, larva, etc., and gives an account of injury to the leaves of *Euphorbia cyparissias* also mentioning a parasite, *Dacnusa incerta* G. In New Jersey, at New Brunswick, on July 10, a parasite of the larva was secured and identified by Mr. S. A. Rohwer as *Opius* n. sp.

A very complete account of this leaf-miner is given by Webster and Parks (Jour. Ag. Res., Vol. I, no. 1, 1913) under the title, "The Serpentine Leaf Miner." This account gives a history of the species in Europe, its wide distribution in the United States, its life history, notes on food plants, descriptions of the various stages and notes on parasites together with advice for controlling its injuries to alfalfa and forage crops. It has a wide range of food plants including cabbage, nasturtium, radish, potato, turnip, spinach, cowpeas, watermelon, beet, pepper, vetch, sweet pea, clover, rape, cotton, tobacco, alfalfa, etc., and was apparently first recorded in America by Riley in 1876.

#### MILKWEED MIDGES.

Dr. E. P. Felt under the title "Hosts and Galls of American Gall Midges" (Jour. Econ. Ent. Vol. IV, p. 454, 1911) and in his "Key to American Insect Galls" (N. Y. St. Mus. Bul., 200, p. 180) gives the following information under *Asclepias*.

Elongate fusiform stem gall on *A. incarnata*.....*Neolasioptera asclepiæ*.  
Rusty brown irregularly swollen young leaves on *A.*

*incarnata* .....*Cecidomyia* sp.

Oval, mid-rib, tumid fold, length 7 mm., diam. 4 mm.

on *A. incarnata*.....*Cecidomyia* sp.

Reared from rolled leaf of *A. syriaca*.....*Lestodiplosis asclepiæ*.

At New Brunswick, N. J., on July 31, whitish, midge larvæ were found in the rolled edges of the leaves of *Asclepias syriaca*. The edges were rolled downward and the larvæ occurred in colonies of from five to twelve. No adults were secured but it is probable that the species was *Lestodiplosis asclepiæ* Felt.

#### **Danaus archippus** Fabr. (Lep.).

Very little need be said about the Monarch butterfly which occurs over the entire continent as far north as southern Canada. In New

Jersey, it can be found from May until November, sparingly before midsummer and commonly until late September. The larva is bright yellow or greenish yellow banded with shining black and furnished with black, fleshy, thread-like appendages on the second thoracic and eighth abdominal segments. It feeds on several species of *Asclepias* and in New Jersey there are three broods. This butterfly migrates in late fall. In May scattering females (and males according to Mr. W. T. Davis) return and provide for the first brood of larvæ. The adults developing from these eggs give rise to a second brood of larvæ and the butterflies developing from the third brood of larvæ leave in swarms for the south during late September and early October.

Various references to publications on the life history and habits of this species can be found in Edwards' Catalogue (Bull. 35, U. S. Nat. Mus.) and numerous papers on this insect have appeared in the entomological journals and popular magazines. An interesting account of the migration of this species and its routes to the south and return can be found in a paper by Mr. Howard J. Shannon entitled "Insect Migrations as Related to Those of Birds" (Scientific Monthly, Sept. 1916).

**Anosia berenice** Cramer (Lep.).

This and the variety *strigosa* Bates which are confined to the southern portions of the United States and South America are also *Asclepias* feeders. Edwards (Bull. 35, U. S. Nat. Mus., p. 18) lists references to the literature on the larva of *berenice*.

**Mamestra legitima** Grt. (Lep.).

In Insect Life (Vol. II, p. 382, 1889-1890) this species is recorded as having been reared during the spring of 1889 from a larva found feeding within a seed pod of *Asclepias incarnata* near LaFayette, Indiana, early in November, 1888. Howard (U. S. D. A. Yearbook, 1898, p. 142) figures the larva, pupa and adult of this species and notes its occurrence and injury in tobacco fields of southern Virginia. Chittenden (Bul. 10, n. s., Div. Ent. U. S. D. A., p. 60, 1898) states that larvæ were found on asparagus plants at Marshall Hall, Md., October 12, 1896. Smith (Ins. N. J., p. 457) records the food

plants as asparagus, beans, cabbage, and a variety of other garden plants. From the above statements, it is evident that *Mamestra legitima* is somewhat of a general feeder but not a species one is likely to find commonly associated with milkweeds.

***Euchætias egle* Drury (Lep.).**

The tufted larvæ of this species occur on milkweed in various sections of New Jersey but during the season of 1920 they were not at all numerous. There are two broods in New Jersey, the moths appearing in June and again in late July and August. Various species of *Asclepias* are recorded as food plants, chief among these being *A. cornuti*. Jewett (Can. Ent., Vol. XII, p. 230, 1880) describes the eggs and first stage larva and states that his notes carry the life history of the insect to the point where Lintner begins. Lintner (24th Rept. N. Y. St. Mus. Nat. His., pp. 136-137, 1870) describes the larvæ after each moult and the cocoon. Edwards (Papilio, Vol. III, p. 147, 1883) also describes the larva in addition to the adults of the spring and fall broods. The adult was described by Drury in 1773 (Ill. Exot. Ent., ii, pl. 20, f. 3) and its distribution is given by Dyar (Bull. 52, U. S. Nat. Mus.) as the Atlantic States.

***Ammalo tenera* Hubner (Lep.).**

This is one of the common tiger moths of the Atlantic States and has been recorded by various authors as feeding on *Asclepias*. Its preferred food plant however appears to be *Apocynum*. Numerous references to the early stages are given by Edwards (Bull. 35, U. S. Nat. Mus.) under the name *Euchættes collaris* Fitch and need not be gone into here.

***Pygarctia eglenensis* Clem. (Lep.).**

Edwards (Papilio, Vol. III, p. 147, 1883) under the generic name *Euchættes* describes the larvæ and adults of the fall and spring broods of this species and gives *Asclepias* spp., especially *A. tuberosa*, as food plants. The adult was described by Clemens (Proc. Acad. Nat. Sci. Phil., XII, 533, 1860) and its distribution is given by Dyar (*loc. cit.*) as South Atlantic States. It is recorded in "Insects of Florida" (Bull. Amer. Mus. Nat. His., Vol. XXXVIII, Art. I, pp. 1-147, 1917, IV Lep.) with the statement, "extends through the Atlantic States to New York."



## PLANT LICE (HOMOP.).

Plant lice were unusually abundant throughout the season, especially on *Asclepias syriaca* and *Asclepias pulchra*, in fact often times, these were the sole insect associates of the plants. The following species were kindly identified by Prof. C. P. Gillette.

**Aphis lutescens** Mon. New Brunswick, N. J., July 9, plentiful on leaves and stems of *A. pulchra* until frost. Plentiful on stems of *A. syriaca* especially near ground during the fall.

**Aphis asclepiadis** Fitch. Riverton, N. J., June 22, plentiful on *A. syriaca*.

**Myzocallis asclepiadis** Mon. New Brunswick, N. J., May 30, plentiful on *A. syriaca*.

**Aphis** sp. Hanover Farms, N. J., June 10, plentiful on *A. syriaca*.

For additional species occurring on milkweeds, see Wilson and Vickery, List of Aphididæ of World (Tr. Wis. Acad. Sci. Art. Let., Vol. XIX, part 1) and Dr. E. M. Patch, Food Plant Cat. of Aphididæ of World, Part VI (Bul. 282, Me. Ag. Exp. Sta.).

**Tetranychus telarius** Linn. (Acar.).

At Monmouth Junction, N. J., on June 19, several plants of *Asclepias syriaca* were found to be heavily infested and badly injured by mites. Elderberry adjoining the milkweeds was also severely infested. The species was identified by Dr. H. E. Ewing as our common spider mite *Tetranychus telarius* Linn.

## OTHER INSECTS ASSOCIATED WITH MILKWEEDS.

The following list of records, dealing for the most part with flower visitors, is necessarily incomplete. Systematic collecting would result in the addition of many new names.

## NEUROPTERA.

**Chrysopa interrupta** Schneid. New Brunswick, N. J., July 4, visiting flowers of *A. syriaca* at night.

## HOMOPTERA.

**Aspidiotus perniciosus** Comst. Listed as attacking milkweed (probably a woody kind) (Essig, Inj. and Ben. Ins. Cal., 1915, p. 180).

## HEMIPTERA.

- Mormidea lugens** Fab. Elizabeth, N. J., Aug. 4, on *A. pulchra* flowers.
- Thyreocoris pulicaria** Germ. So. River, N. J., July 17, plentiful on flowers of *A. syriaca*.
- Lygæus kalmii** Stal. Riverton, N. J., June 22, on *A. syriaca*.
- Microphylellus modestus** Reut. Monmouth Jc., N. J., June 19, on *A. syriaca*.
- Phymata erosa** Linn. Elizabeth, N. J., August 4, numerous in flowers of *A. pulchra*.
- Adelphacoris rapidus** Say. Monmouth Jc., N. J., July 19, on *A. syriaca*.
- Paracalocoris colon** Say. Washington's Crossing, N. J., June 10, on *A. syriaca*.
- Neurocolpus nubilus** Say. Monmouth Jc., N. J., July 14, on *A. pulchra* flowers.
- Stenotus binotatus** Fab. Riverton, N. J., June 22, on *A. syriaca*.
- Pæciloscytus basilis** Reut. So. River, N. J., July 17, on *A. syriaca*.

## COLEOPTERA.

- Adalia bipunctata** L. Riverton, N. J., June 22, on *A. syriaca*.
- This and the following species of coccinellids were associated with plant lice.
- Megilla maculata** DeG. Monmouth Junction, N. J., July 17, on *A. syriaca*.
- Hippodamia convergens** Guer. Monmouth Jc., N. J., July 17, Riverton, N. J., June 22, on *A. syriaca*.
- Coccinella novemnotata** Hbst. South River, Red Bank, July 30, Riverton, June 22, on *A. syriaca*. Rutherford, August 25, on *A. tuberosa*. All localities in N. J.
- Coccinella trifasciata** L. Monmouth Jc., N. J., June 19, on *A. syriaca*.
- Brachyacantha ursina** Fabr. So. River, N. J., July 12, on *A. syriaca*; Washington's Crossing, N. J., on *A. syriaca* flowers.
- Scymnus indutus** Csy. Riverton, New Brunswick, N. J., June 10, July 24, on leaves of *A. syriaca*.
- Antherophagus ochraceus** Mels. So. River, N. J., June 17, on flowers of *A. syriaca*.

- Monocrepidius lividus** DeG. So. River, N. J., July 17, on leaves of *A. syriaca*.
- Lucidota atra** Say. Monmouth Jc., N. J., June 19, on leaves of *A. syriaca*.
- Pyropyga decipiens** Harr. Deal Beach, N. J., July 20, on *A. pulchra* flower buds. Monmouth Jc., N. J., June 19, on leaves of *A. syriaca*.
- Chauliognathus marginatus** Fabr. Monmouth Jc., N. J., June 19, July 17, on leaves and flowers of *A. syriaca*.
- Popillia japonica** Newm. Riverton, N. J., July 27, feeding on *A. syriaca* flowers.
- Macroductylus subspinosus** Fabr. Washington's Crossing, N. J., feeding on *A. syriaca* flowers.
- Anomala lucicola** Fabr. Monmouth Jc., N. J., July 17, on flowers of *A. syriaca*.
- Leptura velutinus** Say. Chester, N. J., July, on *A. syriaca*.
- Tetraopes canteriator** Drap. Throughout New Jersey, local, on milkweeds.
- Labidomera clivicollis** Kirby. Various parts of New Jersey, larvæ and adults feeding on leaves of *A. incarnata*, *A. syriaca* and *A. pulchra*. June, July, August.
- Chrysochus cobaltinus** Lec. Milkweeds, oleander, orchard trees (Essig, Inj. and Ben. Ins. Cal., 1915, p. 259).
- Gastroidea cyanea** Mels. Somerville, N. J., June 30, feeding on leaves of *A. syriaca*.
- Diabrotica 12-punctata** Oliv. Riverton, N. J., June 22, on *A. syriaca*.
- Coptocycla guttata** Oliv. Beatystown, N. J., July, on *A. incarnata*.
- Coptocycla aurichalcea** Fabr. Monmouth Jc., N. J., on *A. syriaca*.
- Epitrix cucumeris** Harris. Princeton Jc., N. J., July 28, very abundant on leaves of *A. syriaca* (det. W. A. Hoffmann).
- Mordella octopunctata** Fabr. Monmouth Jc., N. J., July 14, on flowers of *A. pulchra*.
- Mordella scutellaris** Fabr. Elizabeth, N. J., August 4, on flowers of *A. pulchra*; So. River, N. J., July 17, on *A. syriaca* flowers.
- Epicauta vittata** Fabr. Rahway, N. J., August 6, feeding on *A. pulchra* flowers.
- Gymnetron teter** Fabr. Monmouth Jc., N. J., June 19, on leaves of *A. syriaca*.

**Glyptobaris rugicollis** Lec. On milkweed (Blatchley and Leng, Rhyn. N. E. Amer., p. 366).

**Odontocorynus salebrosus** Csy. On milkweed (Blatchley and Leng, Rhyn. N. E. Amer., p. 386).

**Odontocorynus scutellum-album** Say. Elizabeth, N. J., August 4, on flowers of *A. pulchra*; So. River, N. J., July 17, on flowers of *A. syriaca*.

#### LEPIDOPTERA.

**Danaus archippus** Fabr. New Brunswick, N. J., August 8, visiting flowers of *A. pulchra*.

**Phyciodes tharos** Dru. New Brunswick, N. J., July 31, Deal Beach, N. J., July 2, on *A. pulchra* flowers.

**Heodes hypophlæas** Boisd. Elizabeth, N. J., July 20, visiting *A. syriaca* flowers.

**Pieris rapæ** L. Riverton, N. J., June 22, visiting *A. pulchra* flowers.

**Colias philodice** Gdt. Riverton, N. J., June 22, visiting flowers of *A. pulchra*.

**Papilio polyxenes** Fabr. New Brunswick, N. J., August 8, visiting *A. pulchra* flowers.

**Atrytonopsis verna** Edwards. Elizabeth, N. J., visiting flowers of *A. syriaca*.

**Poanes massasoit** Scud. Princeton Jc., N. J., July 28, visiting *A. pulchra* flowers.

**Ancyloxypha numitor** Fab. Riverton, N. J., August 5, visiting *A. pulchra* flowers; Washington's Crossing, N. J., June 28, plentiful at *A. syriaca* flowers.

**Epargyreus tityrus** Fabr. Princeton Jc., N. J., July 28, visiting *A. syriaca* flowers.

**Hæmorrhagia thysbe** Fabr. Elizabeth, N. J., August 4, visiting *A. pulchra* flowers.

**Scepsis fulvicollis** Hbn. Princeton Jc., N. J., July 28, visiting *A. pulchra* flowers.

**Apamea velata** Walker. New Brunswick, N. J., July 14, visiting *A. syriaca* flowers at night.

**Autographa falcifera** f. **simplex** Kirby. New Brunswick, N. J., July 14, visiting *A. syriaca* flowers at night.

**Melittia satyriniformis** Hbn. Red Bank, N. J., July 30, visiting *A. syriaca* flowers.

**Crambus albellus** Clem. New Brunswick, N. J., July 14, visiting *A. syriaca* flowers at night.

**Archiceps rosaceana** Harr. Rutherford, Dayton, New Brunswick, N. J., July, August. Larvæ in rolled edges of leaves of *A. syriaca* and in pulled-together terminal leaves.

#### HYMENOPTERA.

**Perilampus hyalinus** Say. Chester, N. J., July, visiting flowers of *A. syriaca*.

**Lasius niger americanus** Emery. Riverton, N. J., June 22, attending plant lice on *A. syriaca*.

**Formica fusca subsericea** Say. New Brunswick, N. J., June 24, attending plant lice on *A. syriaca*.

**Formica pallide-fulva nitidiventris** Emery. Riverton, N. J., June 22, on *A. syriaca*.

**Campsomeris plumipes** Drury. Riverton, N. J., June 22, visiting *A. syriaca* flowers and caught by *A. pulchra* flowers.

**Elis quinquecincta** Fabr. New Brunswick, N. J., July 31, August 8, visiting *A. pulchra* flowers.

**Polistes pallipes** Le Pel. New Brunswick, N. J., July 31, visiting *A. pulchra* flowers.

**Amnobia ichneumonea** L. Riverton, N. J., August 5, visiting *A. pulchra* flowers. Flower visitor of *Asclepias* (Hymen. Conn., p. 680).

**Priononyx bifoveolatum** Tasch. Hammonton, N. J., August 3, visiting *A. tuberosa* flowers.

**Cerceris clypeata** Dahl. Riverton, N. J., June 23, visiting *A. syriaca* flowers.

**Philanthus politus** Say. On milkweed flowers (H. L. V.), June 27 (Hymen. Conn., p. 675).

**Microbembex monodonta** Say. So. River, N. J., July 17, visiting *A. syriaca* flowers.

**Oxybelus quadrinotatus** Say. On milkweed flowers, July, August (Hymen. Conn., p. 660).

**Chloralictus pruinosis** Rob. Riverton, N. J., June 22, visiting *A. syriaca* flowers.

**Chloralictus zephyrus** Smith. Riverton, So. River, N. J., June 22, July 17, visiting *A. syriaca* flowers.

**Chloralictus pilosus** Smith. Riverton, N. J., June 22, visiting *A. syriaca* flowers.

**Chloralictus nymphæarum** Rob. Riverton, N. J., June 22, visiting *A. syriaca* flowers.

**Evylaus pectoralis** Smith. So. River, N. J., July 17, visiting *A. syriaca* flowers.

**Halictus viridissimus** Vier. Visiting milkweed flowers, June, August (H. L. V.) (Hymen. Conn., p. 705).

**Anthemoessa bomboides** Cress. Chester, N. J., July, visiting *A. syriaca* flowers.

**Hylæus modestus** Say. On flowers of milkweed, June, July, August (Hymen. Conn., p. 739).

**Megachile brevis** Say. Riverton, N. J., June 22, visiting flowers of *A. syriaca*.

**Megachile infragilis** Cress. Taken on milkweed flowers (Hymen. Conn., p. 745).

**Cœlioxys octodentata** Rob. So. River, N. J., July 17, visiting *A. syriaca* flowers.

**Bremus perplexus** Cress. Chester, N. J., July, visiting *A. syriaca* flowers.

**Xylocopa virginica** Drury. New Brunswick, N. J., July 31, visiting *A. pulchra* flowers.

**Bombias separatus** Cress. Chester, N. J., July, visiting *A. syriaca* flowers.

Throughout the season, many honey bees were observed visiting the flowers of *A. syriaca* and *A. pulchra*.

#### DIPTERA.

**Scatopse brevicornis** Mg. Riverton, N. J., June 22, visiting *A. syriaca* flowers (det. Malloch).

**Syrphus rectus** O. S. Elizabeth, N. J., August 4, visiting *A. pulchra* and *A. syriaca* flowers (det. Johnson).

**Sphærophoria cylindrica** Say. Riverton, N. J., July 26, visiting *A. syriaca* flowers; Wyckoff, N. J., July 28, larva feeding on aphids on *A. syriaca* (det. Johnson).

**Toxomerus marginata** Say. So. River, N. J., July 17, visiting *A. syriaca* flowers (det. Johnson). For an interesting account of this

fly and its relation to *Apocynum* flowers, see Osburn (Ohio Jour. Sci., Vol. XX, No. 7, May, 1920).

**Eristalis arbustorum** Linn. Elizabeth, N. J., July 20, visiting *A. syriaca* flowers (det. Johnson).

**Helophilus chrysostoma** Wied. So. River, N. J., July 17, visiting *A. syriaca* flowers (det. Johnson).

**Helophilus distinctus** Will. So. River, N. J., visiting flowers of *A. syriaca* (det. Johnson).

**Conops xanthopareus** Will. New Brunswick, N. J., visiting *A. pulchra* flowers (det. McAtee).

**Cistogaster immaculata** Maq. Elizabeth, N. J., August 4, visiting *A. pulchra* flowers (det. Malloch).

**Trichopoda pennipes** Fabr. Princeton Jc., N. J., July 29, visiting *A. syriaca* flowers (det. Johnson).

**Pollenia rudis** Fabr. New Brunswick, N. J., July 5, caught by *A. syriaca* flowers (det. Malloch).

**Lucilia sericata** Mg. Elizabeth, N. J., July 20, caught by *A. syriaca* flowers (det. Malloch).

**Phormia terræ-novæ** Desv. New Brunswick, N. J., July 5, caught by *A. syriaca* flowers (det. Malloch).

**Elachiptera costata** Loew. New Brunswick, N. J., September 10, bred from decayed seed pods of *A. syriaca* (det. Johnson). Coquillett (Bull. II, n. s., U. S. D. A., Div. Ent.) records the following facts about this species:—bred from oats and fall wheat plants; bred from larvæ found in decayed cavity in roots of radish and from larvæ found in a decayed melon root.

**Egle radicum** L. So. River, N. J., July 17, caught by *A. syriaca* flowers (det. Malloch). In Smith's Insects of New Jersey, p. 791, this is listed as the radish maggot, often troublesome.

**Rivellia quadrifasciata** Macq. Riverton, N. J., July 26, on *A. pulchra* (det. Johnson).

**Chætochlorops inquilina** Coq. New Brunswick, N. J., September 16, bred from decayed seed pods of *A. syriaca* (det. Johnson). These pods were first injured by the larvæ of *Rhyssomatus lineaticollis*. Coquillett (*loc. cit.*) lists this species as having been bred from the following:—from a cecidomyiid gall on aster; from a puparium found in a cavity in apple, doubtless made by the codling

moth; from twigs of *Cephalanthus occidentalis*, these twigs being infested by the larva of *Laverna cephalanthiella* Chamb.; from egg sac of a spider and from a berry of *Solanum carolinense*.

**Agromyza pusilla** Mg. New Brunswick, N. J., August 15, and various parts of New Jersey. Mining leaves of *A. syriaca* and *A. pulchra* (det. Malloch).

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### SOME NEW GENERA AND SPECIES OF COLEOPTERA COLLECTED AT WESTFIELD, CHAUTAUQUA CO., N. Y.

BY HOWARD NOTMAN,

BROOKLYN, N. Y.

In a collection of Coleoptera made by the writer from May 16th to 30th, 1919, the following species were found which are believed to be undescribed. Two seem to require the erection of new genera. The following correction should be noted in the "Coleoptera Collected at Windsor," etc. (JOURNAL N. Y. ENT. SOC., XXVIII, p. 181). *Daya ingratura* Csy. should be *Traumæcia ingratura* Csy.